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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/065,489	10/23/2002	Roy Edward Rand	124365	7330

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MCANDREWS HELD & MALLOY, LTD
500 WEST MADISON STREET
SUITE 3400
CHICAGO, IL 60661

EXAMINER

JOHNSTON, PHILLIP A

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 09/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/065,489	Applicant(s) RAND, ROY EDWARD	
	Examiner Phillip A Johnston	Art Unit 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>9-3-2004</u> . | 6) <input type="checkbox"/> Other: _____ |

Detailed Action

1. This Office Action is submitted in response to Amendment dated 6-24-2004, wherein claims 1-21 are pending.

Claims Rejection – 35 U.S.C. 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-21 stand rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,386,445 to Rand, in view of Findeisen, U.S. Patent No. 3,586,901, and in further view of Matsui, U.S. Patent No. 5,442,183.

Rand (445) discloses an apparatus and method to control beam-generated ions in a CT scanner that includes;

(a) Removing ions with an upstream clearing electrode, as recited in Claims 1 and 6. See Column 1, line 63-68; and Column 2, line 1-19.

(b) Trapping ions with a trap electrode, as recited in Claims 1,3,5,7, 10 and 12. See Column 2, line 20-29 and 57-68.

(c) A CT system, as recited in Claims 7, and 14-16. See Column 3, line 44-62.

Rand (445) as applied above fails to teach a tube located downstream of an ion trap, as recited in Claims 7 and 8.

However, Findeisen (901) discloses an electron gun having a conductive shroud (tube) 16 attached to second anode 14 that extends downstream from the electron gun chamber. The first anode, represented by button 30 of FIG. 1, is at a higher potential than the second anode, represented by isolation means 14. As illustrated graphically, in FIG. 3, this creates a "potential hill" 40 which each positive ion formed outside the region between cathode 23 and anode 14 must overcome in order to be attracted to the cathode. The height of this potential hill may conveniently be from 50 to 150 volts. Accordingly, most of the positive ions having the requisite kinetic energy requirements at the instant of formation to reach the cathode of a conventional electron gun are actually prevented from reaching the electron gun cathode because their kinetic energies are insufficient to overcome the potential hill existing between the first and second anodes of the electron gun; only the relatively few ions with kinetic energy above 50 to 150 electron volts along path 37 at the instant of emergence from the electric field of anode 14 can enter the electron gun chamber and strike the cathode thereof. See Column 4, line 47-61; and Column 5, lines 5-24, and 40-55.

It is implied herein that the use of a tube that extends downstream from anode 14 in accordance with Findeisen (901) is equivalent to the use of a tube located downstream from an ion trap, as recited in Claims 7 and 8.

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Therefore it would have been obvious to one of ordinary skill in the art that the CT scanning system of Rand (445) can be modified to use a conductive tube downstream from an ion trap in accordance with Findeisen (901), to provide a constant electric field, thereby reducing perturbations of the electron beam path.

Rand (445) in view of Findeisen (901) as applied above fails to teach the use of a grounded tube, as recited in Claims 1,7, and 8. However, Matsui (183) discloses a charged particle beam apparatus that includes a grounded final cylindrical electrode. See Column 15, line 61-65.

Therefore it would have been obvious to one of ordinary skill in the art that the CT scanning system of Rand (445) in view of Findeisen (901) can be modified to use a grounded cylindrical electrode in accordance with Matsui (183), to provide an electric field that minimizes aberration.

Regarding Claims 2,4,9,11,13, and 17-21, Rand (445), in view of Findeisen (901), in further view of Matsui (183), discloses the claimed invention except for;

(a) Adjusting the aperture of the trap electrode to adjust spherical aberration correction, as recited in Claims 2,11,17, and 20.

(b) Adjusting the radius and position of the grounded tube to adjust the range of spherical aberration correction, as recited in Claims 4,9,13,17-19, and 21.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to adjust the trap aperture size and the grounded tube radius, since it has been held that discovering an optimum value of a result effective variable involves only, routine skill in the art.

Matsui (183) discloses in FIG. 5(B) the result of computations on a chromatic aberration coefficient C_c and a spherical aberration coefficient C_s in effect when the electron beam 2 is focused using the electrostatic lens comprising the electrodes 5, 6 and 7 of FIG. 5(A). In this example, the working distance A is set for 3 mm, and the electrode-to-electrode distances B and C are set for 2 mm each. The final electrode 7 is connected to ground potential.

Matsui (183) is evidence that ordinary workers in the art of spherical aberration correction would find the reason, suggestion, or motivation to vary the aperture size of electrodes, as well as the radius of the cylinder to determine there effects in reducing spherical aberration.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform calculations utilizing electrode dimensions as variables to improve spherical aberration.

In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). A particular parameter must first be recognized as a result-effective variable, i.e., a variable, which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.

Examiners Response to Arguments

4. Applicant's arguments filed 6-24-2004 have been fully considered but they are not persuasive.

Argument 1

Applicant states that, "Rand does not teach or suggest a grounded tube downstream of an ion trap as recited in claims 1-21."

The applicant is respectfully directed to Column 4, line 28-34 in U.S. Patent No. 5,193,105 to Rand, which has been incorporated by reference in Rand (445), which states; In yet another aspect, the present invention further includes first and second conventional ion clearing electrodes (ICEs), preferably coaxially disposed immediately upstream and downstream from the RICE. These ICEs are coupled to a large negative potential (e.g., -1.5 kV) to sweep away all positive ions on either side of the RICE.

In addition, the applicant is respectfully directed to Column 7, line 23-30 in U.S. Patent No. 5,193,105 to Rand, which has been incorporated by reference in Rand (445), which states; Each RICE embodiment 46, 46' is preferably conical shaped such that the ratio between the electrode radius (R) and the beam radius r_o is constant. The generally conical geometry is significant because if $R/r_o \sim \text{constant}$, then the electrical potential at the electron beam 12 axis is essentially constant. This means

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that positive ions trapped within the beam 12 will not drift axially, downstream or upstream.

As well as, Column 11, line 36-46 in 5,193,105, which states; As shown in FIG. 3, ICE 50's elements 66A, 66B, 68A and 68B are coupled, respectively, to potential sources V_{66A} , V_{66B} , V_{68A} and V_{68B} , and the elements of ICE 50', 66'A, 66'B, 68'A and 68'B are respectively coupled to potential sources V'_{66A} , V'_{68B} , V'_{68A} and V'_{68B} . As disclosed in the above patent to Rand, et al., by suitably selecting the magnitudes of the potential sources to which the ICE electrodes are coupled, ICEs 50, 50' can be made to sweep away positive ions, while maintaining a uniform electric field.

And, Column 11, line 47-52 in 5,193,105, which states;

Accordingly, it is preferred that $V_{68A} \approx V'_{68A} \approx -1.5$ kV, $V_{68B} \approx V'_{68B} \approx 0$ V (e.g., ground), $V_{66A} \approx V_{66B} \approx V'_{66A} \approx V'_{66B} \approx 0.5(V_{68A}) \approx -750$ V. V'_{68A} and V'_{68B} may also be reversed. Potential V_{68A} could, however, be other than -1.5 kV, with the other electrode potentials being changed accordingly.

And Figure 3 in 5,193,105, attached below;

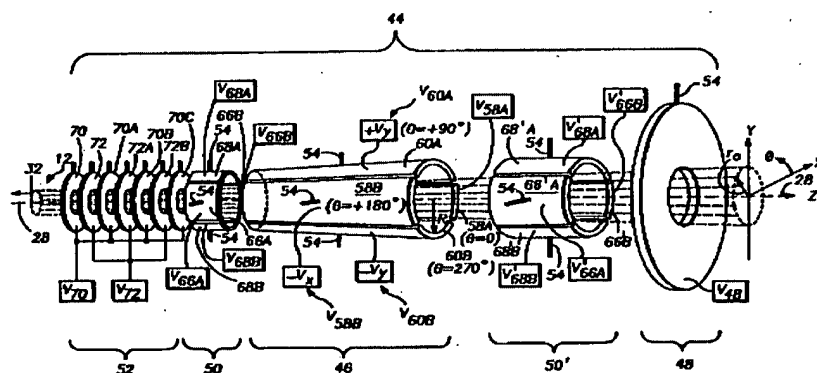


FIG.-3

The examiner has interpreted from the Rand (445) references above that a grounded tube 50' and an ion trapping region 46 are used in the downstream region to allow ions to accumulate therein, as recited in claims 1,7,17, and 19.

Argument 2

Applicant states that, "As an additional example, Rand does not teach or suggest altering spherical aberration correction as recited in claims 1-21."

Applicant also states that, "No grounded tube or similar system or method for altering spherical aberration correction is taught or suggested by Matsui. Thus, neither alone nor in combination with Rand and Findeisen, does Matsui teach or suggest the limitations recited in claims 1-21."

The applicant is respectfully directed to Column 2, line 32-35 in U.S. Patent No. 5,193,105 to Rand, which has been incorporated by reference in Rand (445), which states; A uniform space-charge density is desired because any optical aberrations due to the electron beam self-forces would then be eliminated.

Also in 5,193,105, Column 3, line 31-33, which states; The RICE improves image sharpness by homogenizing the electron beam space-charge density, thereby linearizing the beam optics and eliminating aberrations.

The applicant is further respectfully directed to Matsui (183), Column 1, line 14-16, which states; A curve (c) in FIG. 3 illustrates the chromatic aberration coefficient of a typical magnetic lens (lens gap=4 mm; lens aperture diameter=3 mm).

The examiner has interpreted from the Matsui (183) reference above that lens aperture diameter is a results effective variable of electron optics, and as such was

included in the aberration correction calculations of Matsui (183) as described above in the Non-Final Office Action of 3-29-2004.

The examiner has interpreted from the Rand (445) references above, that optical aberrations are corrected through the use of an ion trap with a grounded tube, as recited in claims 1,7,17, and 19.

Conclusion

5. The Amendment filed on 6-24-2004 under 37 CFR 1.131 has been considered but is ineffective to overcome the Rand (445), Findeisen (901), and Matsui (183) references.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


6. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (571) 272-2475. The examiner

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can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (571) 272-2477. The fax phone number for the organization where the application or proceeding is assigned is 703 872 9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PJ
September 3, 2004


JOHN R. LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800